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AUTHORITY

ATD ltr 2 Dec 1965

STEP

AUTHOR: (8) Mel'nikov, P. V.

TITLE: (6) On the problem of the measurement of the characteristic function of a stationary ergodic process

PERIODICAL (5) Elektrosvyaz', no. 12, 1962, 19 - 25

TEXT: Dealing with the measurement of the characteristic function of stationary ergodic processes, the author shows first how the argument interval must be chosen so that the characteristic function should be unambiguously determined by the results of measurements, i.e. by the readings. The expression underlying the design of the device for the measurement of characteristic functions of ergodic processes is

$$\mathscr{P}(s,T) = \frac{1}{T} \int_0^T \cos [x(t)s]dt + \frac{1}{T} \int_0^T \sin [x(t)s]dt$$

s being the argument of the characteristic function. Resorting to Kotel'nikov's

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On the problem of the measurement of...

theorems for the characteristic function and the probability density, the author shows that the limited-spectrum characteristic function $\mathscr{P}(s)$ is fully determined by its instantaneous values measured at intervals $\mathscr{T}/x_m = \Delta s$, $\Delta s$ depending thus on the maximum instantaneous value of the signal $x_m$ which occurs in the communication system. He deduces an expression giving $\mathscr{P}(s)$ in terms of $\Delta s$, and applies this expression to a practical case. He also deduces two formulae linking the measured values of the characteristic function respectively with the probability density of the investigated random process and the one-dimensional integral law of the distribution of probabilities, as well as a set of formulae linking the measured values of the characteristic function with the distribution moments. The accuracy of the deduced formulae was checked and found satisfactory. There is 1 table.

SUBMITTED: June 7, 1962

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